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Parental restriction and children's diets: the chocolate coin and Easter egg experiments

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Abstract

Two naturalistic experiments are reported exploring the impact of parental restriction on children's diets. For study 1, 53 parents gave 75g of chocolate coins to their child over a weekend. For study 2, 86 parents were recruited prior to the two week Easter break when their children would be receiving chocolate Easter eggs. For both studies, parents were randomly allocated to either the non-restriction or restriction conditions and rated their child's preoccupation with the target food and other sweet foods (demanding and eating) at the start and end of the interventions. Perceived and actual food intake was assessed. Children in the restriction conditions consumed fewer chocolate coins and Easter eggs. All children showed decreased preoccupation with chocolate coins or Easter eggs over the course of the studies yet by the end the restriction group were more preoccupied with the target food. In contrast, all children showed an increased preoccupation with other sweet foods as the studies progressed which was greater in the non restriction group for the chocolate coins study. Overall, restriction resulted in reduced intake but relative increased preoccupation with the food being restricted. Non restriction resulted in a greater preoccupation with other sweet foods once the target foods had been consumed.

Key words: parental control; children's diets; obesity; restriction; healthy eating

Over the past forty years there has been an increased prevalence of diet related problems in the Western world including childhood obesity (Chinn and Rona, 2001). For example, in 1999, Reilly and Dorosty reported that 22% of 2630 English children were overweight and 10% were obese by 6 years old and in 2007 research indicated that the prevalence of overweight children in the US had doubled in the past 20 years (Ogden et al, 2007). Further, Deckelbaum and Williams (2001) reported that there were approximately 22 million overweight children under the age of 5yrs across the world. Research has therefore addressed the problem of children's eating behaviour and subsequent body weight and has highlighted a number of key factors including the obesogenic environment, peer pressure, schools and the child's own tastes and preferences (Lindsay et al., 2006).

One area that has received much consideration is the impact of parental control and the ways in which parents manage their children's diet. In particular, research indicates that parental control is common within families and one study revealed that parental restrictive rules were the most frequently reported style of eating practices in the homes of children aged 7-11 years (Hart, Bishop and Truby, 2002). In addition, Casey & Rozin (1989) found that 40% of parents believed that restricting access to certain foods would decrease their child's preference for these foods. In line with this, control practices have been conceptualised into different constructs by different authors. For example, Birch and colleagues have carried out a number of studies exploring the impact of control and developed the Child Feeding Questionnaire which operationalised control in terms of monitoring, restriction and pressure to eat (Birch et al, 2001). In a similar vein, Wardle et al (2002) categorised control in terms of providing food in response to a child's emotional distress, using food as a reward, applying pressure to eat or applying restrictions upon eating. In contrast, Ogden, Reynolds and Smith (2006) focused on the restrictive aspects of parental feeding practices and categorised this into two main types of control termed covert and overt control. Covert control was defined as

when the child is unaware of the restriction placed upon them, such as managing their environment through choosing not to buy unhealthy foods or only taking children to restaurants that sell healthy options, whereas overt control was defined as a form of control that the child is aware of.

Research has also addressed the impact of different types of control on how a child eats and their body weight and several studies suggest that control can be problematic. For example, using the CFQ, research has concluded that parental pressure is associated with the development of dietary restraint and disinhibition in young girls (Carper, Fisher & Birch; 2000) and that parental restriction is associated with higher levels of body fat in children (Sprunijt-Metz, Lindquist, Birch, Fisher & Goran; 2002). Similarly, studies indicate that restricting feeding practices increase children's preference for the restricted food (Birch, Zimmerman, & Hind, 1980) and promote overeating when restricted foods are freely available (Fisher & Birch, 1999; Fisher et al. 2000). Birch (1999) reviewed the evidence for the impact of imposing parental control on food intake and argued that it is not only the use of foods as rewards that can have a negative effect on children's food preferences but also attempts to limit a child's access to foods. She concluded from her review that 'child feeding strategies that restrict children's access to snack foods actually make the restricted foods more attractive' (1999: 11). From this perspective parental control would seem to have a detrimental impact upon a child's eating behaviour.

In contrast, however, some studies suggest that parental control may actually reduce weight and improve eating behaviour. For example, Wardle et al. (2002: 453) suggested that 'lack of control of food intake [rather than higher control] might contribute to the emergence of differences in weight'. Similarly, Brown and Ogden (2004) reported that greater parental control was associated with higher intakes of healthy snack foods and Ogden et al (2006) concluded that whereas overt control was associated with an increased intake of healthy

snacks, covert control was linked to a decrease in unhealthy snacks. Similar results were also found in another sample of parents with small children (Brown, Ogden et al, 2008).

Research has therefore explored the role of parental control on child's diet and weight. There are however, several problems with this literature which need to be addressed. First, many of the studies are cross sectional in their design and yet draw causal conclusions (even if presented tentatively). There is, however, evidence that some parents only control their children's diet because they are already overweight and over eating with parental control being a consequence rather than a cause of a child's diet and body weight. For example, Birch and Fisher's (2000) path analysis showed that although maternal feeding practices were related to short-term eating regulation, it was in response to overeating and weight gain, rather than a cause of it. Experimental research is therefore needed. In addition, the experimental research that has been completed has often taken place in the laboratory rather than in a naturalistic environment. Although this enables extraneous variables to be controlled it raises questions about the ecological validity of the study. Further, many measures of control are non specific and refer to controlling diets in general using terms such as 'unhealthy foods', 'some foods' or 'snack foods'. This suggests that parental control is a generalised behaviour and assumes that these terms are interpreted by different parents in the same way. Furthermore, this non specific approach limits the potential to assess whether controlling one type of food influences a child approach to that food only, or also to other foods in their diet.

The present paper therefore presents the results from two studies designed to add to the current evidence base for the impact of parental control on their child's eating behaviour by addressing some of the problems with the existing literature. First both studies used an experimental design to enable conclusions about causality to be made. Second, the studies took place within the participants' day to day lives thereby increasing the ecological validity

of the data and improving its generalisability to normal practice. Third, the form of parental control was specific to one food type (chocolate coins / Easter eggs) and its consequences were measured in terms of both this specific food and an additional related food (sweet foods). This enabled both the specific and generalised impact of control to be assessed. The studies also focused on one form of parental control (ie overt control) as this construct finds reflection in the focus on ‘restriction’ central to all key measures of control and can be manipulated with simple instructions (Ogden et al, 2006; Brown et al, 2008). In particular, study 1 explored the impact of parental overt control on children’s preoccupation and intake of chocolate coins over the course of a weekend, whereas study 2 explored the impact of parental overt control on children’s preoccupation and intake of Easter eggs over a two week period. These foods were selected to address real dilemmas faced by parents at celebratory times of the year (ie Christmas and Easter) when their children receive large amounts of chocolate that need to be managed in an effective way. Preoccupation with food was operationalised in terms of demanding and eating behaviours.

Study 1: The impact of parental restriction on preoccupation with chocolate coins and food intake.

Method

Design

An experimental between subjects design was used with two conditions: parental restriction versus non restriction of food. All parents were given a 75g bag of chocolate coins (approx 20 coins) on a Friday to give to their child over the weekend (Saturday & Sunday) and were randomly allocated to either the restriction or non restriction group. Measures of the child’s preoccupation with food (chocolate and other sweets), the parents rating of how much their child had eaten and the actual amount of chocolate consumed was

assessed on the following Monday morning. Preoccupation with food involved measures of both demanding and eating behaviours.

Participants

The sample consisted of 53 children aged 1-7 years (mean age 3 years old (SD=1.6)) and their parents. The sample was evenly split between boys (n=28) and girls (n=24) and the majority were described as normal weight (90.5%). The majority of parents in the study were female (mean age 36yrs old (SD=4.2)), white (n=47 (90.4%)), and the majority rated themselves as being normal weight (75.5%). They were evenly split between those who had up to graduate (n=22; 42.3%) and above graduate (n=30; 57.7%) levels of education. Participants were randomly allocated to either the non-restriction group (n=29) or restriction group (n=24). Participant demographics by condition are shown in Table 1.

-insert Table 1 about here-

The two conditions were comparable on all child and parent demographics apart from ethnicity with those in the non restriction group being all white, whilst 5 people described themselves as either Asian or other in the restriction group. Ethnic group was used as a covariate in subsequent analysis involving ANOVAs but had no significant impact on the results.

Procedure

Participants were recruited from the campus nursery or via staff email at a University in the South of England. Once participants had consented to take part in the study they were randomly allocated to either the non restriction or the restriction group using a random number generator. They were given a 75g bag of chocolate coins on a Friday to give their

child from 10am on Saturday and continue through to the end of Sunday. Questionnaire data was collected either in person on the Monday or electronically by email.

The intervention

A 75g bag of chocolate coins was provided to each parent to give to their child over the weekend. They were then given the following instructions according to whether they were in the non-restriction or the restriction group:

Non restriction group: Parents allocated to this group were instructed as follows: ‘On Saturday morning at 10am please show your child the bag of chocolate coins and give them one. Then please deal with your children’s consumption of chocolate coins over Saturday and Sunday in the following ways: i) Allow your child to have access to chocolate coins as and when they want; ii) Allow your child to eat chocolate coins at any time of day; iii) Allow your child to eat as many chocolate coins as they want iv) Please weigh the amount of chocolate coins at the beginning and at the end of the weekend and record this for us.

Restriction group: Parents allocated to this group were instructed as follows: ‘On Saturday morning at 10am please show your child the bag of chocolate coins and give your child one. Then please restrict your children’s consumption of chocolate coins over Saturday and Sunday in the following ways: i) Place all chocolate coins in a cupboard away from your child’s reach; ii) Do not allow your child to eat chocolate coins within 1 hour of any meal; iii) Do not allow your child to eat more than 1 chocolate coin at a time (within half an hour of each other); iv) Please weigh the amount of chocolate coins at the beginning and at the end of the weekend and record this for us.

Measures

Parents completed a series of measures after the intervention on the following Monday morning. Where appropriate, reliability was assessed using Cronbach's alpha.

1. Parental and child demographics

i) **Parent:** This assessed which parent was in control of the study, gender, age, actual weight (kg), perceived weight (under weight / normal weight / a bit overweight / overweight), height(m); ethnic group (White, Black, Asian, other), highest level of education (secondary school / college / university / postgraduate).

ii) **Child:** This assessed: gender; age, actual weight(kg), perceived weight (under weight / normal weight / a bit overweight / overweight); height(m).

BMI for both parent and child was computed.

2. Preoccupation with food

Parents were asked to rate their child's preoccupation with food at both the start (time 1) and end (time 2) of the weekend in response to the questions 'At the start of the weekend how often did your child.....' and 'After the weekend how often did your child.....' in terms of four constructs.

i) **Demanding chocolate** (4 items: 'demand chocolate coins'; 'talk about chocolate coins'; 'want to eat chocolate coins'; 'ask for chocolate coins', baseline alpha = 0.78, follow-up alpha = 0.84).

ii) **Eating chocolate coins** (4 items: 'eat chocolate coins'; 'eat chocolate very fast'; 'eat lots of chocolate in one go'; 'feel ill from eating chocolate'; baseline alpha = 0.71, follow-up alpha = 0.74).

iii) Demanding other sweet foods (4 items: ‘demand other sweet foods’; ‘talk about other sweet foods’; ‘want to eat other sweet foods’; ‘ask for other sweet foods’ baseline alpha = 0.92, follow-up alpha = 0.92).

iv) Eating other sweet foods (1 item: ‘eat other sweet foods’).

The answers were rated on a Likert scale ranging from ‘Never’(1) to ‘Always’(5).

3. Food intake

This was assessed in terms of the following:

i) Perceived chocolate intake: i) ‘How many chocolate coins has your child eaten over this weekend? (All of them / most of them / some / a few / none; rated 1-5); ii) ‘How many chocolate coins does your child now have left?’ (All of them / most of them / some / a few / none; rated 1-5).

ii) Actual intake: This was assessed in terms of the mass (grams) remaining at the end of the weekend. The majority of parents completed this variable themselves, although a minority returned the empty wrappers to the researcher.

4. Adherence to protocol

In order to evaluate whether parents adhered to the study protocol parents completed two sets of measures to assess a) level of restriction (3 items: to what extent did you; ‘place chocolate coins in the cupboard’, ‘control how many chocolate coins your child ate’, ‘tell your child to eat less chocolate coins’, alpha = 0.7) and b) level of non-restriction (2 items: to what extent did you; ‘allow you child to eat as many chocolate coins as they wanted’; ‘allow your child to eat chocolate coins when they wanted’, r = 0.92). The answers were rated on a Likert scale ranging from ‘Never’(1) to ‘Always’(5).

Data analysis

The data were analysed in the following ways: i) to assess adherence to protocol using independent t tests ii) to assess the impact of the intervention on preoccupation with food from the start to the end of the weekend using repeated measures ANOVA and post hoc tests iii) to explore the impact of the condition on food intake using Mann Whitney U and independent t tests.

Results

1. Adherence to protocol

In order to assess adherence to the protocol mean scores to restrictive and non restrictive behaviours over the course of the weekend were compared between the two groups. The results showed that the restriction group reported being significantly more restrictive than the non restriction group (mean 3.6 (SD= 0.63) vs mean 1.4 (SD=0.6); $t=12.85$; $p=0.0001$) and the non restriction group reported higher non restrictive practices than the restriction group (mean 4.83 (SD=0.6) vs mean 1.63 (SD= 0.6); $t=-0.89$, $p=0.0001$) indicating that the experimental instructions had resulted in different parenting practices in the two conditions.

2.Impact of condition on preoccupation with food.

The impact of condition on preoccupation with chocolate coins and sweet foods in terms of demanding and eating behaviours from the start to the end of the weekend is shown in Table 2.

-insert Table 2 about here –

The results showed no main effect of condition for any measures. The results did show main effects of time for preoccupation with both chocolate coins and other sweet foods in terms of both demanding and eating behaviours. However, whereas the preoccupation with chocolate coins (demanding and eating) decreased over the course of the weekend preoccupation with

other sweets foods (demanding and eating) increased. The results also showed condition by time interactions for demanding chocolate coins, eating chocolate coins and demanding other sweet foods. No interaction was found for eating sweet foods. In terms of preoccupation with chocolate coins the means indicated that although all participants showed a decrease in demanding and eating chocolate this decrease was greater in the non restriction group than the restriction group (demanding: $t=-3.46$, $p=0.001$; eating: $t=-4.66$, $p=0.001$). Further, post hoc tests indicated that although the non restriction group reported higher preoccupation with chocolate coins at the start of the study than the restriction group (demanding: $t=2.6$, $p=0.01$; eating: $t=2.89$, $p=0.006$), by the end of the study the restriction group reported significantly higher preoccupation in terms of eating behaviours ($t=-2.28$, $p=0.02$). In terms of preoccupation with other sweet foods, the non restriction group showed an increase in demanding behaviours whereas the restriction group showed no change. Post hoc tests indicated that the non restriction group reported lower demanding behaviours after the start of the study ($t=-2.17$, $p=0.03$), but that the two groups were comparable by the end ($t=0.22$, $p=0.8$).

3. The impact of condition on food intake

The impact of condition on food intake is shown in Table 3.

-insert Table 3 about here -

The results showed significant differences between conditions for both measures of perceived mass consumed and actual mass consumed with participants in the non restriction group showing greater perceived and actual intake of chocolate coins than those in the restriction group.

Conclusion

The results from this first study indicated that parental non - restriction of chocolate coins over the course of a weekend resulted in an initial increase in preoccupation with chocolate coins in terms of both demanding and eating behaviours and an overall increased intake of coins in terms of both perceived and actual mass consumed. However, although all participants, regardless of condition, showed a decrease in this preoccupation as the weekend progressed this decrease was greater in the non restriction group than the restriction group. Therefore by the end of the weekend the restriction group showed higher levels of preoccupation with chocolate coins in terms of eating behaviours than the non restriction group. In contrast, all participants showed an increased preoccupation with other sweet foods in terms of demanding behaviours, although this increase was more pronounced in the non restriction group.

The main problem with this study was the short time frame as a weekend period did not enable any understanding of the longer term impact of parental restriction. In addition, participants commented that it was hard to differentiate between their child's behaviour at the start and end of the study due to the close proximity of these time points. Furthermore, some of the children in this first study were very young and parents commented that it was hard to determine the extent that they were demanding chocolate coins. To address these problems study two followed a similarly naturalistic design with the same measures but explored parents' restriction of chocolate Easter eggs over the Easter period of two weeks using an older sample. Furthermore, rather than giving the parents chocolate, the second study utilised the Easter eggs that were naturally given to the children to increase the ecological validity of the design.

Study 2: The impact of parental restriction of Easter eggs on children's preoccupation with Easter eggs and food intake.

Method

Design

The study used an experimental between subjects design with two conditions: parental restriction vs non restriction of Easter Eggs.

Participants

Parents of children (n=86) aged 4-11 (mean age 7.5 years (SD=2.1) were recruited from four Primary Schools in the South of England a week before the start of the two week Easter break. They were split evenly between boys (n=43) and girls (n=43) and the majority were described as normal weight (n=72; 88.9%). The majority of the parents taking part in the study were women (n=77), white (n=81; 94.2%) with a mean age of 39 years (SD=5.3). The majority of parents described themselves as normal weight (n=45; 52.3%) although a large minority considered themselves 'a bit overweight' (n=31; 36%). Differences in parent and child demographics by condition are shown in Table 4.

-insert Table 4 about here –

The results showed that the two groups were comparable on all demographics apart from parental education, parent weight and parent BMI as those in the restriction group having higher levels of education, lower weight and lower BMI. To this end parental education, weight and BMI was used as a covariate in all subsequent analyses using ANOVAs but were found to have no significant effect.

The intervention

The instructions for the interventions were the same as for the chocolate coin study with the words 'Easter eggs' replacing 'chocolate coins' and the interventions prefaced with

the phrase ‘When you child receives Easter eggs over the coming break please could you manage them in the following ways’.

Measures

The measures of parent and child demographics, preoccupation with chocolate and other sweet foods, perceived and actual eating behaviour and adherence to the protocol were the same as those used in the chocolate coin study and were completed at the end of a two week period by email or face to face. The questions relating to the start of the study (time 1) were framed as ‘When your child first got the Easter eggs over the first few days how often did they do the following...’ in order to capture the initial impact of the intervention. The follow up questions (Time 2) were framed as ‘Now think about your child at the end of the Easter period. Over the past few days how often did your child do the following...?’ For actual mass, parents were asked to use the box labels to assess how much chocolate their child received and then to weigh any chocolate remaining by the end of the two week period. They were also asked not to allow other family members to eat the children’s Easter eggs. Reliability was assessed using Cronbach’s alphas. All alphas were above 0.6 as in study 1.

Data analysis

The data were analysed in the following ways: i) to assess differences between the two conditions for adherence to protocol using independent t tests ii) to assess the impact of the intervention on preoccupation with chocolate and sweet foods using repeated measures ANOVA and post hoc tests iii) to assess the impact of the intervention on perceived and actual mass consumed using Mann Whitney U and t tests.

Results

1. Adherence to protocol

The results showed significant differences in restrictive practices between the two groups with those in the restriction group reporting greater restriction than those in the non restriction group (mean 3.6 (SD=0.9) vs mean 2.2 (SD=1.0); $t=6.57$, $p=0.0001$) and those in the non restriction group showing greater non restriction than those in the restriction group (mean 3.8 (SD=1.3) vs mean 1.6 (SD=0.8), $t=-9.4$, $p=0.0001$) indicating that the intervention resulted in different parenting practices in the two conditions.

2. Impact of intervention on preoccupation with food.

Ratings of preoccupation with food in terms of both Easter eggs and other sweet foods and in terms of both demanding and eating behaviours both at the start and end of the two week period are shown in Table 5.

-insert table 5 about here –

The results showed no main effects of condition for any measures. The results did show significant main effects of time for all measures of preoccupation with Easter eggs and other sweet foods. However, whereas preoccupation with Easter eggs in terms of both demanding and eating behaviours decreased over the course of the study, preoccupation with other sweet foods for these measures increased. In addition, the results showed significant condition by time interactions for preoccupation with Easter eggs in terms of both demanding and eating behaviours but not for preoccupation with sweet foods. The means indicate that although all participants showed a decrease in these variables over the two week period this decrease was significantly more pronounced in the non restriction than the restriction group (demanding: $t=2.03$, $p=0.04$; eating: $t=3.5$; $p=0.001$). In particular, for demanding behaviours, although both groups showed comparable levels after the first few days of the study ($t=0.17$; $p=0.8$) by

the end of the study preoccupation was higher in the restriction than the non restriction group ($t=2.01$; $p=0.05$). For eating behaviours, although the non restriction participants showed greater preoccupation after the first few days ($t=-0.35$; $p=0.001$), by the end of the study the two groups were comparable ($t=-0.4$; $p=0.6$).

3. Impact of the intervention on food intake.

The impact of the intervention on perceived and actual food intake is shown in Table 6.

-insert table 6 about here –

The results showed that perceived eggs eaten and actual mass consumed was higher in the non restriction group than the restriction group. No differences were found for perceptions of how many Easter eggs were left.

Conclusion

This second experimental study explored the impact of parental restriction of children's food in a naturalistic setting using a longer follow up period than study 1 and an older sample. The results indicated that both perceived and actual intake of Easter eggs was higher in the non restriction groups. However, although all participants showed a decrease in their preoccupation with Easter eggs over the course of the study this was more pronounced in the non restriction group with those in the restriction group having higher scores after the two week period. In contrast all participants became more preoccupied with other sweet foods, but this did not vary by condition.

Discussion

This paper presents the results from two experimental studies in naturalistic settings designed to explore the impact of parental restriction on both the preoccupation with the food

being restricted and other sweet foods. The two studies produced very similar findings. First, both studies showed that those in the restriction group consumed fewer chocolate coins and Easter eggs than those who had not had their food intake restricted. This supports previous research indicating that parental restriction may be an effective method for managing children's diets and when effective can result in a reduced intake of unhealthy foods (eg. Wardle et al, 2002; Brown and Ogden, 2004; Ogden et al, 2006).

The results, however, also indicated that this may only occur in the shorter term due to changes in the preoccupation with the food being restricted. In particular, both studies indicated that although non restriction resulted in an initial increase in the preoccupation with the food being restricted, and although all participants showed a reduction in this preoccupation over the course of the studies, this reduction was greater in the non restriction than restriction participants. Accordingly, by the end of both studies, those in the restriction group reported that their children were more preoccupied with either chocolate coins or Easter eggs compared to those in the non restriction condition as operationalised in terms of both demanding and eating behaviours. Previous research indicates that parental restriction may have a detrimental impact on beliefs about food and food preferences (eg. Birch, Zimmerman, & Hind, 1980; Birch et al, 1999). The results from the present study provide experimental evidence for this effect and indicate that over time restricting a child's consumption of unhealthy foods may sustain a child's preoccupation with this food rather than allowing the natural decay in their interest caused by simple exposure. In addition, the results provide evidence for this process in a naturalistic setting enabling the results to be generalised to the dilemmas faced by parents in their day to day lives, beyond the confines of the laboratory. Accordingly, although restriction effectively limited what the children ate over the course of the studies, non restriction produced a more pronounced deterioration in preoccupation with food by the time the interventions had ended.

The study also explored the generalisability of parental restriction and assessed the impact on preoccupation with other sweet foods. Both studies indicated that all children showed an increase in the preoccupation with sweet foods regardless of the intervention. It is possible that introducing unhealthy foods into a household raises the salience of such foods which in turn makes children desire them more. This suggestion finds reflection in the notion of covert control which highlights how controlling children's diets simply by reducing exposure and managing their environment in ways not detected by the children, may result in healthier food choices and preferences (Ogden et al, 2006; Brown et al, 2008). Conversely, in the present study, the arrival of either chocolate coins or Easter eggs into the home, reflected poorer covert control resulting in less healthy food preferences. The two studies did differ, however, in the impact of condition on preoccupation with other sweet foods. In the Easter egg study both groups showed a similar increase in their preoccupation with other sweet foods. In the chocolate coin study, however, this increase was more pronounced in the non restriction group. On examination of the means the results indicate that this difference is due to much lower scores in the non restriction group at the start of the study. In particular, it would seem that whilst chocolate coins were still available, those in the non restriction group were more preoccupied with this form of chocolate rather than other sweet foods and therefore had a much lower score at study onset. Towards the end of the study, however, as the coins started to run out, those in the non restriction group turned their attention to other sweet foods. Those in the restriction group may not have made this switch in their attention as they were still focusing on the coins which were being withheld from them. Previous studies often use generalised terms of restriction such as 'unhealthy foods' and 'snacks' and measure the outcome with similarly general dietary terms (Brown and Ogden, 2004; Fisher and Birch, 1999; Ogden et al, 2006). The results from this study indicate that parental restriction of specific foods may have a specific impact on the foods being restricted and

should therefore be measured and evaluated in a similarly specific way. Accordingly, the impact of specific restriction does not generalise necessarily to other foods. In fact, there may well be a rebound or compensatory effect on other foods, although this needs to be tested further. In line with this, it should not be assumed that the consequences of parental restriction are consistent for all food types and across different time frames.

These results have implications for research and parenting practice. In terms of research, longer term experimental studies are needed to explore the consequences of parental restriction over time and how the influence of restriction changes and develops across childhood as a child gains increasing independence. Research also needs to address the specificity, generalisability and possible rebound effects of parental restriction and the ways in which managing one area of a child's life may impact upon another area, whether food related or not; it is possible that restricting one type of food may not only influence the child's relationship with that and other similar foods but also other appetitive substances such as cigarettes and alcohol. In terms of parenting practice, the results indicate that in the short term restriction is an effective means to promote healthier eating. But the results also indicate that it may exacerbate preoccupation with unhealthy foods which in the longer term could encourage the very behavior it is trying to prevent. Parents therefore need to find more effective means to manage their children's diets in the longer term. Ideally they could use non restrictive practices, as in line with the findings from the two studies presented here, this could lead to lowered preoccupation, and possibly lowered intake in the longer term. But in a world where children have easy access to unhealthy high fat and cheap food in abundance this is unlikely to be effective. Accordingly, parents need to find a strategy which limits their child's diet without creating either increased preoccupation with that food, or a rebound effect onto other foods. One solution could be covert control defined in previous work although this requires further research (Ogden et al, 2006; Brown et al, 2008).

There are however, several problems with the two studies which need to be considered. First, both studies took place outside of the laboratory as a means to improve their ecological validity, which in turn brings with it many of the issues associated with naturalistic research. In particular, the study required the parents to rate both their child's preoccupation with food and their actual food intake. Such self report data is open to bias, particularly given that parents were not blinded to the aims of the study which could have resulted in social desirability effects. In addition, parents were asked to rate their child's preoccupation with foods retrospectively, at the end of the study which could have been influenced by issues of recall and judgment. Furthermore, although the parents appeared to have adhered to the intervention instructions, this again was measured using self report. The design of the study, however, required self report data by the parents as the data was being collected away from the research environment. Second, the sample involved highly educated parents and children from a wide age range. This limits the generalisability of the study to other populations. In addition, it is possible that different forms of parental restriction have different effects on children of different ages. Further research, with larger samples enabling sub group analyses could explore this possibility. Finally, it is possible that the parent's usual control practices would influence the outcome of the intervention, depending upon how close their usual behavior was to their allocated condition. Future research could address this by sampling strategically and allocating parents to that intervention which was most similar (or different) to their own usual behavior. The present study, however, aimed to take a more heterogeneous sample and randomly allocate them to different practices and the adherence to protocol data indicates that this was, in the main, effective. Given these problems, however, the results do provide some insights into the causal impact of parental control on two naturally occurring situations in which parents have to manage their child's food intake.

To conclude, most previous research exploring parental restriction has been laboratory based or cross sectional in design. The present two studies used an experimental design in two commonly occurring naturalistic settings to explore the impact of parental restriction of a specific food on the intake and preoccupation with that and other related foods. The results showed that across both studies parental restriction resulted in lower food intake. The results also showed that whilst parental non restriction of both chocolate coins and Easter eggs resulted in an initial higher preoccupation with that food, this quickly deteriorated over time following exposure. In contrast parental restriction resulted in greater preoccupation by the end of the study period. Accordingly, by restricting the intake of either chocolate coins or Easter eggs, children's preoccupation with these foods was maintained. Parents often face a dilemma when their children are given unhealthy foods at times of celebration: 'restrict it' or 'let them eat it and get it over and done with'. The results from the present studies indicate the following: if they want their child to eat less overall then restrict it. If they want their child to be less preoccupied with trying to eat it then let them have it and get it over and done with.

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Table 1: Study 1: Parent and child demographics by condition

Variable	Non restriction (n=29)	Restriction (n=24)	t / X ²	P
Child demographics				
Child sex	M=17 (58.6%) F=12 (41.1%)	M=11 (47.8%) F=12 (41.4%)	X ² =0.6	0.4
Child age	X=3.62 SD=1.39	X=3.3 SD=-1.8	t=0.7	0.4
Child weight	X=16.57 SD=3.65	X=16.75 SD=4.55	t=-0.14	0.89
Child height	X=1.04 SD=0.09	X=1.02 SD=0.15	t=0.44	0.66
Perceived child weight	Under weight = 2 (6.9%) Normal=27 (93.1%) A bit overweight = 0 (0%) Overweight =0 (0%)	Underweight = 1 (4.3%) Normal = 21 (91.3%) A bit overweight=1 (4.3%) Overweight = 0 (0%)	X ² =21.41	0.5
Child BMI	X=15.18 SD=1.39	X=3.3 SD=1.8	t=-1.68	0.12
Parent demographics				
Parent sex	M=5 (17.2%) F=24 (82.8%)	M=2 (8.3%) F=22 (91.7%)	X ² =0.9	0.34
Parent age	X=36.4 SD=3.5	X=35.7 SD=5.0	t=-0.6	0.5
Parent weight	X=68.94 SD=10.1	X=64.34 SD=13.31	t=1.38	0.17
Parent height	X=1.68 SD=0.11	X=1.66 SD=0.07	t=0.42	0.59
Perceived parent weight	Under weight = 0 (0%) Normal=19 (65.5%) A bit overweight = 7 (24.1%) Overweight =3 (10.3%)	Underweight = 0 (0%) Normal = 21 (91.3%) A bit overweight = 3 (13%) Overweight =2 (8.7%)	X ² =1.2	0.6
Parent BMI	X=24.5 SD=4.2	X=23.1 SD=3.9	t=-1.23	0.2
Ethnicity	White=29 (100%) Black=0 (0%) Asian=0 (0%) Other=0 (0%)	White=18 (78.3%) Black=0 (0%) Asian=4 (17.4%) Other=1 (4.3%)	X ² =6.5	0.03
Education	Secondary=1 (3.4%) College=2 (6.9%) University=9 (31%) Postgraduate=17 (58.6%)	Secondary=0 (0%) College=4 (17.4%) University=6 (26.1%) Postgraduate=13 (56.5%)	X ² =2.14	0.6

NB: Bold denotes significant (p<0.05)

Table 2: Study 1: Impact of intervention on preoccupation with chocolate and other sweet foods (means / SDs).

	Non restriction (n=29)		Restriction (n=24)		ME cond	ME time	Cond x time
	Time 1	Time 2	Time 1	Time 2			
Demandin	X=2.8	X=1.31	X=2.3	X=1.56	F=0.52	F=82.32	F=9.35
g chocolate	SD=0.86	SD=0.51	SD=0.94	SD=0.68	P=0.47	P=0.001	P=0.004
					E ² =0.01	E²=0.62	E²=0.16
Eating	X=2.5	X=1.15	X=1.84	X=1.5	F=1.1	F=61.16	F=21.65
chocolate	SD=0.82	SD=0.3	SD=0.8	SD=0.7	P=0.3	P=0.001	P=0.001
					E ² =0.02	E²=0.55	E²=0.29
Demandin	X=1.59	X=2.13	X=2.03	X=2.08	F=0.9	F=8.7	F=5.95
g sweet	SD=0.76	SD=1.06	SD=0.69	SD=0.67	P=0.36	P=0.005	P=0.02
foods					E ² =0.02	E²=0.2	E²=0.11
Eating	X=1.62	X=2.24	X=1.91	X=1.91	F=0.29	F=12.9	F=2.34
sweet foods	SD=0.82	SD=0.98	SD=0.83	SD=0.83	P=0.59	P=0.001	P=0.13
					E ² =0.01	E²=0.2	E ² =0.04

NB: Bold denotes significant (p<0.05); E²=partial Eta squared

Table 3: Study 1: Impact of intervention on perceived and actual mass consumed.

Variable	Non restriction (n=29)	Restriction (n=24)	t / U	P / E²
Perceived coins consumed	None=0 (0%) Few = 2 (6.9%) Some = 3 (10.3%) Most = 7 (24.1%) All = 17 (58.6%) Mean Rank=35.09	None = 0 (0%) Few = 7 (29.2%) Some = 10 (41.7%) Most = 6 (25%) All = 1 (4.2%) Mean rank=17.23	U=113.5	0.0001
Perceived coins left over	None=16 (55.2%) Few = 7 (24.1%) Some = 4 (13.8%) Most = 2 (6.9%) All = 0 (0%) Mean rank=20.55	None = 3 (12.5%) Few = 6 (25%) Some = 9 (37.5%) Most = 5 (20.8%) All = 1 (4.3) Mean rank=34.79	U=161.00	0.0001
Actual mass consumed	X=62.03 SD=19.55	X=36.71 SD=23.37	t=4.25	0.001 E²=0.3

NB: Bold denotes significant ($p < 0.05$); E²=partial Eta squared

Table 4: Study 2: Parent and child demographics by condition

	Non-Restriction (n=41)	Restriction (n=45)	t/X²	P
Child Sex	M=17 (41.5%) F=24 (58.5%)	M=26 (57.8%) F=19 (42.2%)	X ² =2.28	.13
Child Age	X=7.4 SD=1.98	X= 7.96 SD=1.66	t=-0.49	0.63
Child Weight	X=25.50 SD=6.24	X=27.33 SD=6.51	t=1.14	0.26
Child Height	X=124.62 SD=11.13	X=126.60 SD=13.29	t=-0.81	0.42
Perceived Child Weight	Under=2 (5.1%) Normal=34 (87.2%) A bit over weight=3 (7.7%) Overweight=0 (0%)	Under=1 (2.4%) Normal=38 90.5%) A bit over weight=3 (7.1%) Overweight = 0 (0%)	X ² =0.45	0.8
Child BMI	X=16.33 SD=2.71	X=16.94 SD=3.49	t=0.95	0.35
Parent Sex	M=6 (14.6%) F=35 (85.4%)	M=3 (6.7%) F=42 (93.3%)	X ² =1.45	0.23
Parent Age	X=40.37 SD=5.14	X=38.40 SD=5.24	t=-1.75	0.08
Parent Weight	X= 68.00 SD=10.72	X=63.07 SD=8.57	t=-2.17	0.03
Parent Height	X=163.94 SD=8.56	X= 165.41 SD=8.04	t=0.46	0.65
Parent Perceived Weight	Under=2 (5.1%) Normal=17 (43.6%) A bit over weight=19 (48.7%) Overweight=1 (2.6%)	Under=0 (0%) Normal=28 66.7%) A bit overweight=12 (28.6%) Overweight=2 (4.8%)	X ² =6.5	0.09
Parent BMI	X=25.61 SD=3.60	X=23.79 SD=4.52	t=-2.37	0.02
Parental Ethnicity	White=39 (95.1%) Black=0 (0%) Asian=2 (4.9%) Other=0 (0%)	White=42 (93.3%) Black=1 (2.2%) Asian=0 (0%) Other=2 (4.4%)	X ² =4.94	0.18
Parental Education	Secondary=11 (26.8%) College=10 (24.4%) University=5 (12.2%) Postgraduate=15 (36.6%)	Secondary=3 (6.7%) College=12 (26.7%) University=17 (37.8%) Postgraduate=13 (28.9%)	X²=11.28	0.01

NB: Bold denotes significant ($p < 0.05$); E^2 =partial Eta squared

Table 5: Study 2: Impact of intervention on preoccupation with chocolate and other sweet foods (means / SDs)

	Non restriction (n=41)		Restriction (n=45)		ME condition	ME time	Cond x time
	Time 1	Time 2	Time 1	Time 2			
Demanding chocolate	M=2.9 SD=0.75	M=2.04 SD=0.85	M=2.9 SD=0.67	M=2.34 SD=0.67	F=1.4 P=0.2 E ² =0.02	F=115.3 P=0.001 E²=0.2	F=4.2 P=0.04 E²=0.05
Eating chocolate	M=2.6 SD=0.77	M=1.8 SD=0.82	M=2.1 SD=0.49	M=1.78 SD=0.58	F=3.8 P=0.054 E ² =0.04	F=95.3 P=0.001 E²=0.53	F=13.2 P=0.001 E²=0.14
Demanding sweet foods	M=2.1 SD=0.84	M=2.8 SD=0.8	M=2.2 SD=0.86	M=2.3 SD=0.75	F=0.01 P=0.9 E ² =0.001	F=10.3 P=0.002 E²=0.11	F=1.7 P=0.2 E ² =0.02
Eating sweet foods	M=2.2 SD=0.87	M=2.54 SD=0.77	M=2.22 SD=0.84	M=2.4 SD=0.74	F=0.15 P=0.6 E ² =0.01	F=12.3 P=0.001 E²=0.13	F=1.3 P=0.26 E ² =0.02

NB: Bold denotes significant (p<0.05); E²=partial Eta squared

Table 6: Study 2: Impact of intervention on perceived and actual food intake

Variable	Non restriction	Restriction	t / U	P / Eta²
Perceived eggs consumed	None=0 (0%) Few = 4 (9.8%) Some = 15 (36.3%) Most = 15 (36.6%) All = 7 (17.1%) Mean rank=48.8	None = 0 (0%) Few = 8 (17.4%) Some = 23 (50.0%) Most = 11 (23.9%) All = 4 (8.7) Mean rank=38.6	U=722	0.04
Perceived eggs left over	None=8 (19.5%) Few= 13 (31.7%) Some=13 (31.7%) Most=7 (17.15) All=0 (0%) Mean rank=39.8	None=8 (17.4%) Few=8 (17.4%) Some=14 (30.4%) Most=16 (34.8%) All-=0 (34.8%) Mean rank=48.6	U=753	0.09
Actual mass consumed	X=693.1 SD= 443.1	X=415.32 SD=329.0	t=3.18	0.002 E²=0.12

NB: Bold denotes significant ($p < 0.05$); E^2 =partial Eta squared